Gender Labor Earnings Gap in Costa Rica Over the Last Decade: What Drives it and the Effect of the Covid-19 Pandemic

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Abstract

Empirical literature assessing the gender labor earnings gap in developing countries is scarce and it is scarcer in the context of the Covid-19 pandemic. We address the gender labor earnings gap in Costa Rica over the last decade, analyzing its determinants and the effect of the Covid-19 pandemic. To do this, we use a pooled cross-sectional dataset for 2010-2020 and a panel dataset for 2020-2021 to estimate Mincerian earnings functions by gender and to decompose its gap using two Oaxaca-Blinder approaches. To decompose the gender earnings gap in the context of the Covid-19 pandemic, we use the novel *xtoaxaca* Stata command, which is an approach suitable to conduct a before-after comparison for panel- and pooled cross-sectional- data. We found that the overall gender earnings gap in Costa Rica was positive (in favor of men). The higher reward women obtained from their endowments did not compensate their lesser leverage using these endowments. We further found a reduction on the gender earnings gap in favor of women over the two immediate quarters after the Covid-19 pandemic started, due to the sharper fell down on jobs where men were earned relative higher than women. The coefficient associated to the pandemic contributed to this reduction, respectively in 0.133 log points and 0.124 log points, between the first quarter of 2020 (pre pandemic) and the second- and third- quarter of 2020 (post pandemic).

Keywords

Gender pay gap, developing countries, earnings determinants, Oaxaca-Blinder Decomposition, Covid-19 pandemic

Acknowledgement

We are very grateful to the Instituto Nacional de Estadística y Censos (INEC) for providing us with the data required to carry out this study and for providing us valuable technical advice. We are also very grateful with Juan Robalino, director of the Institute of Economic Sciences Research at the University of Costa Rica for his useful comments to the estimations conducted.

Note

This is a research on progress and it may be susceptible to changes after receiving feedback in this conference and other academic exchanges.

Introduction

The gender pay gap is still an ongoing concern in most of the labor markets in developed and developing countries. In 2018, men's monthly earnings were 22% higher than those for women around the world (ILO, 2018). There is a vast literature assessing the gender pay gap in developed countries, while in developing countries it is much scarcer. The main determinants of the gender pay gap have been measured and identified in developed countries over the last decades (e.g. for Greece, Karamessini & Ioakimoglou, 2007, 2007; for Europe, UK and Australia, O'Reilly, Smith, Deakin, & Burchell, 2015; for the US, Blau & Lawrence M, 2017; for Japan, Hara, 2018; for the EU, Boll & Lagemann, 2019; for Israel, Kimhi & Hanuka-Taflia, 2019; for Germany, Biewen & Seckler, 2019; for the UK Jewell, Razzu, & Singleton, 2020). There are other studies in developed countries which have studied particular contexts (e.g. the Italian private sector, Töpfer, 2017; the Financial Planning Industry in a set of countries, Tharp, Lurtz, Mielitz, Kitces, & Ammerman, 2019; the risk of automation in Europe, Aksoy, Özcan, & Philipp, 2021).

For developing countries, which is the case of Costa Rica, there are few recent empirical studies measuring the gender pay gap and assessing its determinants (e.g. Aderemi & Alley, 2019; Deshpande, 2020; Duraisamy & Duraisamy, 2016; Lee & Wie, 2017; Maldonado, 2020; Pham & Reilly, 2007; Rendall, 2013; Semykina & Linz, 2010). Pham & Reilly (2007), by using the VLSS 1992/93 and 1997/98 and VHLSS 2002 dataset, estimated the gender wage gap in Vietnam for 1993, 1997, and 2002. They applied a Mincerian earnings function and Oaxaca-Blinder (OB) decomposition. The authors found that the gender pay gap has narrowed down at some points of the wage distribution and there was little evidence of a glass-ceiling effect for Vietnamese women. Semykina & Linz (2010) based on data collected from surveys conducted among employees in 2005, estimated the relationship between personality and earnings in Russia, Armenia, and Kazakhstan and whether the gender pay gap was explained by locus of control (LOC) when earnings estimates were controlled for personal-, human capital- and job-related-determinants. They applied Oaxaca-Blinder-Neumark decomposition and concluded that personality was a determinant of earnings and the gender pay gap. In Russia and Armenia, the gender differences in personality explained a non-trivial portion of the gender pay gap; while in Kazakhstan, the role of personality in explaining the gender pay gap was barely significant. Duraisamy & Duraisamy (2016), using four rounds of the NSS data (1983, 1993–94, 2004–05, and 2011–12) estimated the gender pay gap across different wage distribution segments of the Indian labor market. The authors applied Mincerian earnings functions and OB decomposition; and quantile regression and Machado-Mata-Melly

decomposition. They found that the gender pay gap diminished across the wage distribution due to decrease in the productive characteristics gap. The authors further observed a sticky-floor and discrimination across the wage distribution, being the discrimination higher at the bottom segments and over the last years. In another study for India using NSS (1999-2000 and 2009-10) with data constricted to salaried workers and applying OB- and Mata-Machado-Melly decompositions, Deshpande, Goel, & Khanna (2018) came to similar results as Duraisamy & Duraisamy (2016). Aderemi & Alley (2019), using Nigerian 2009 HNLS-NBS data, estimated the gender pay gap in the public and private sectors. The authors applied the Mincerian earnings function corrected by selection bias and the OB decomposition. They found that there was a smaller gender pay gap in the public sector rather than the private sector, because of women better educational qualifications and relative longer stay in the workforce. Lee & Wie (2017), using four rounds of the CHIPS Chinese data (1988, 1995, 2002, and 2010) and five rounds of the NSS Indian data (1987-88, 1993-94, 1999-2000, 2005-06, and 2009-10) estimated the urban labor markets gender pay gap and its determinants in the 1990s and 2000s. The authors applied an OLS estimation and the decomposition technique proposed by Juhn, Murphy, & Brooks (1991) and then applied to gender analysis by Blau & Kahn (1997). The authors found that Chinese gender pay gap widened due to the worsened labor qualifications and raised discrimination of female workers; whilst for India, there was a sharp bridging in the gender pay gap due to the higher wage gain for low- and middle-skill female workers. Rendall (2013) conducted a research with cross-sectional data from World Bank Household Survey, IPUMS International, IPUMS USA, and IPUMS CPS for 1987-2008 to examine the labor earnings gap in Brazil, India, Mexico and Thailand. The authors, using the Mincerian earnings and Wellington wage decomposition, found that respectively India, Thailand and Brazil showed the highest gender pay gap and; the latter one, the largest reduction of it over the period of analysis because of the contribution of skill changes. They also showed that Mexico had a negative gender pay gap, which means that women earned higher wages than men. Maldonado (2020) studied the gender pay gap in the formal sector in Venezuela for 1985- 2015, applying OLS and quantile regressions and decomposing the gender pay gap using the OB-, Cotton-, and pooled- methods. The author found that women earned by about 21% less than men in the formal sector and that there was a clearer inequality in low quantiles in 2015. The author also found that education is the determinant which had the largest contribution bridging the gender pay gap; while the industry in which the person works, the largest increasing effect

There is a concern about the effects of the Covid-19 pandemic on widening the gendered labor gaps, being the pay gap one of the most vulnerable (Power, 2020). In spite of this concern, empirical studies examining the effects of the Covid-19 pandemic on the pay differences between men and

women are very scarce. To the best of our knowledge, there are only two academic works analyzing this topic (Deshpande, 2020; Doorley, O'Donoghue, & Sologon, 2021). Deshpande (2020), based on Indian panel data from the CMIE, estimated the effects of the Covid-19 pandemic on the gender gaps in paid and unpaid work. The authors exploited the availability of data during pre- and post-pandemic and during lockdown and recovery phase, to compute a DID estimation of the effect of the Covid-19 on gender differences on the access to the labor market, finding a significant large contraction in both men and women employment. They also found that women's likelihood of being employed relative to men declined 9.5 percentage points when comparing the periods pre- and post- pandemic. As regards income, the author estimated a linear model to compare gender earnings between April 2019 and April 2020, finding a reduction in income by 28 percentage points, being the men who exhibited the sharper decrease. The authors explained that the reason behind this result is that Indian wage or salaried work accounts for almost all earnings and men faced a sharper job loss. Doorley et al. (2021) based on the Irish 2017 subsample of the European Union Survey on Income and Living Conditions (EU-SILC), estimated the effect of the Covid-19 pandemic on the gender pay gap. The authors applied the microsimulation methodology named "nowcasting" and the Doorley & Keane (2020) gender income gap decomposition. The authors found that the decrease in men's incomes might be higher compared to the one for women during the pandemic, being occupational segregation the most important determinant of this likely result. They explained that the structure of the women's occupation and industry profited them in terms of earnings.

The contribution of our paper to the literature on gender pay gap is threefold. First, it provides new evidence to the scarce literature on the differences in labor earnings between men and women in developing countries, by using a large-scale dataset with a vast set of human capital- and employment-related- determinants. Second, to the best of our knowledge, it estimates for the first time the effect of the Covid-19 pandemic on the gender pay gap using a panel with individual observations pre- and post-pandemic. Third, it applies the novel Stata *xtoaxaca* command (Kröger & Hartmann, 2021), which allows us to decompose the explained and unexplained components of the gender earnings gap and the change in its contribution to it, including the effect associated to the Covid-19 pandemic shock.

Our estimation showed that, over the last decade, there was a gender labor earning gap in Costa Rica (in favor of men). In spite of the higher rewarded women obtained from its endowments compared to men, their higher relative loss leveraging endowment (which is related with productivity or discrimination), resulted in an overall labor earning gap in favor of men. The schooling was the most

influential predictor on bridging the gender earnings gap (in favor women). By contrary, the constant term was the most influential factor of men's relative higher earnings, which in previous literature are related with unobserved productivity or unobserved discrimination (for an in-depth discussion, see Blau & Lawrence M, 2017). Further, it showed that there was a reduction on the gender labor earnings gap during the two immediate quarters after the Covid-19 pandemic started, which may be explain by the sharper fell down on jobs where men were earned relative higher than women. The coefficient associated to the pandemic contributed to this reduction, respectively in 0.133 log points and 0.124 log points, between the first quarter of 2020 (pre pandemic) and the second- and third- quarter of 2020 (post pandemic). These results were consistent with the sample- and model- robustness check applied.

The remainder of the paper is organized as follows. Section 2 shows an overview of the main indicators of the Costa Rican economic activity and labor market over the last decade, emphasizing on the period around the Covid-19 pandemic. Section 3 presents the empirical approaches to estimate and to decompose the gender earnings gap with cross-sectional- and panel- data, and the data description and its descriptive analysis. Section 4 presents the main results of the estimations and robustness check. Section 5 concludes and discusses the findings, as well as, some policy implications.

An Overview of Labor Market in Costa Rica Over the Last Decade: Gender Analysis and the Context of the Covid-19 Pandemic

Over the last decade, Costa Rican economy has shown a deceleration in its economic growth rate and it has been reflected on its worsening labor market indicators. According to the Central Bank of Costa Rica statistics, the economic growth rate over 2010-2020, measure as the change in the Gross Domestic Product (GDP), was of around 3%; while, over 2015-2020 was of 2.1%. These results reflected a sharper deceleration over the most recent years. Particularly, with the Covid-19 pandemic, the 2020 GDP change was of -4.5%. Figure A1 of the Statistical Appendix also shows the comparison of the Costa Rican economic growth path compared to the three most affected industries by the Covid-19 pandemic, respectively, *Accommodation and food services*, *Transportation and storage*, and *Wholesale and retail trade*. The former one faced the sharper reduction on its production level (around 50%) during an entire year, and the two latter ones of around 20%, and 10%, respectively.

Regarding the labor market, Figure 2 of the Statistical Appendix shows that the net participation rate has presented a pattern of stagnation around 50% for women, whilst for men it shown a pattern of deceleration in between around 75% to 70%. The underemployment rate has shown an increasing trend

for both men and women, particularly higher for the latter ones. At the end of 2019 (pre pandemic), the overall unemployment rate in Costa Rica was of 12,4%; for men it was of 9,6%, while for women it was of 16,7%. As expected, the unemployment situation has worsened even further with the Covid-19 pandemic crisis. Costa Rican unemployment rate reached a peak of 24% in the second quarter of 2020; for men it was of 20%, while for women it was of 30.4%. The underemployment rate has shown a stagnation pattern for both men and women and it has been higher for the latter group. This indicator also showed a peak of 20.5% in the second quarter of 2020 and it was almost equal for men and women. The rate of informality has also shown a stagnation around 40% over the last decade. This indicator captures the people who are employed but do not have access to social security or those who are owners of a business that is not register on the *Registro Nacional* or not doing accounting on a regular basis, as a percentage of the total of occupied people. [1] It highlighted that according to Costa Rican labor market data on pandemic times, informal employment has been the most affected group. For example, in the second quarter of 2020, 72.5% of employees classified in this group faced a reduction in its occupation or a higher unemployment (for an in-depth analysis, see INEC, 2021).

Methodological Approach

Empirical Method

We use an extended Mincerian earnings function Mincer (1974) to estimate the labor earnings differences between males and females for pooled cross-section and panel data. Mincerian earnings functions are a broadly tested and convenient method to estimate the returns to human capital in different contexts and population groups (Montenegro & Patrinos, 2014a). Afterwards, we use the Oaxaca-Blinder (OB) decomposition method proposed by Oaxaca (1973) and Blinder (1973) to identify the portion of the gap attributable to the difference in endowments and the portion due to differences in the coefficients and their interactions. The OB is one of the most influential decomposition methods in labor economics, laying the foundation for several new approaches to decomposition analysis (Fortin, Lemieux, & Firpo, 2010).

The Extended Mincerian Function

We estimate an extended Mincerian earnings function for males and females with traditional human capital- and some additional job-related- determinants. Based on previous research, we assume

[1] The computation of the rate of formality variable is explained on the following link: http://sistemas.inec.cr/pad5/index.php/catalog/276/variable-groups/VG11.

a selection bias due to the correlation between earnings and labor force participation (Heckman, 1979). Therefore, we apply the Heckman selection model to obtain consistent estimates for the parameters.

$$[log\ (w_{it})|x_i\theta + \varepsilon_{it} > 0] = \beta_0 + \beta_n Z_{it} + \beta_\lambda \lambda_i(x_i\theta) + u_{it} \quad (1)$$

where $log\ (w_{it})$ is the natural logarithm of the earnings (hourly or monthly) for the i_{th} individual in time t; β_n the vector of coefficients associated to earnings determinants; Z_{it} the matrix of human capital and job-related determinants; $\beta_\lambda \lambda_i(x_i\theta)$ the Heckman correction term; and u_{it} the error term. For panel data, we include fixed quarterly effects δC_{q0t} to control for time invariant characteristics that may impact earnings as shown in equation 2, where δ is our coefficient of interest (it allows us to estimate the effect of the Covid-19 in earnings) and FE_{q0t} is a categorical variable which zero/based category is a pre pandemic period. The model carried out a triple interaction among the FE_{q0t} term, the group variable (Sex_i, that represented the sex of the person employed), and one by one, with the decomposition variables DV_i^m (whether a person was working on the public or private sector, on Covid-sensitive industries or not, and on a full-time or a half-time employment). These three decomposition variables, represented in the predictor DV_i^m by the superscript *m,* were selected based on previous analysis on the main potential sources of the difference on earnings between men and women due the Covid-19 pandemic.[2]

$$[log\ (w_{it})|x_i\theta + \varepsilon_{it} > 0] = \beta_0 + \beta_n Z_{it} + \delta FE_{q0t}\ Sex_{it}\ DV_{it}^m + u_{it} \quad (2)$$

Panel data allowed us to obtain a more accurate estimation of the effect of the Covid-19 pandemic on the earnings of the i_{th} individual and assess its impact on the gender labor earnings gap.

The Decomposition Method

The OB decomposition is a suitable method to understand the differences in outcomes achieved by two groups of individuals (Fortin et al., 2010). This method separates the difference in earnings in both explained and unexplained components, and it allows to show the total contribution of each independent variable to the gap between groups. The explained component, known as endowments effect, accounts for the part of the gap that can be attributed to differences in the values of the endowments. It can be interpreted as the change in earnings for females if they had the same endowments as males. The unexplained component can be construed as a residual as it relates to the

[2] We would like to thank the technical group in charge of the Employment Survey of Costa Rica (ECE), who provided us advice about the potential sources of differences between men and women earnings due to the Covid-19 pandemic.

effects of the coefficients and the interactions between coefficients and endowments. The coefficients effect shows the change in earnings for females if they had the same coefficients as males applied to their endowments and this is related with productivity of the individuals using its endowments. The interaction effect accounts for the simultaneous differences in endowments and coefficients for both groups.

The decomposition can be expressed as:

$$\boldsymbol{D} = E(\boldsymbol{Y}_M) - E(\boldsymbol{Y}_W) = \underbrace{\underbrace{\{E(\boldsymbol{Z}_M) - E(\boldsymbol{Z}_W)\}'\boldsymbol{\gamma}_W}_{\text{Endowments effect}}}_{Explained\ component}$$

$$+ \underbrace{\underbrace{E(\boldsymbol{Z}_W)'(\boldsymbol{\gamma}_M - \boldsymbol{\gamma}_W)}_{\text{Coefficients effect}} + \underbrace{\{E(\boldsymbol{Z}_M) - E(\boldsymbol{Z}_W)\}'(\boldsymbol{\gamma}_M - \boldsymbol{\gamma}_W)}_{\text{Interaction effect}}}_{Unexplained\ component} \quad (3)$$

where D is the difference in the predicted values of the hourly earnings Y, Z the vector of endowments, and γ the vector of coefficients (including the intercept term).

For the decomposition of the quarterly gender labor earnings gap, we make use of Stata command *oaxaca*, proposed by Jann (2008). For the panel included in our sample, we use the Stata command *xtoaxaca,* proposed by Kröger & Hartmann (2021). This allows to estimate the decomposition of the change in differences with pooled cross-sectional or panel data and it is an extension of the *oaxaca* command (Equation 4).

$$\Delta Y = \Delta Y_t - \Delta Y_s$$

$$= \left(E(Y_t^A) - E(Y_t^B)\right) - \left(E(Y_s^A) - E(Y_s^B)\right)$$

$$= E(Y_t^A) - E(Y_t^B) - E(Y_s^A) + E(Y_s^B)$$

$$= E(Y_t^A) - E(Y_s^A) - E(Y_t^B) + E(Y_s^B)$$

$$= E(Y_t^A) - E(Y_s^A) - \left(E(Y_t^B) - E(Y_s^B)\right)$$

$$= \Delta Y^A - \Delta Y^B \quad (4)$$

where ΔY is the observed change in the difference in gender earnings during a period of time. Similarly, *xtoaxaca* decomposes the changes in this difference in an explained and unexplained component. Intuitively, this approach may be interpreted as the difference between two OB decompositions at different time points. It also allows us to measure the contribution of each earnings determinant to the observed change in the earnings gap.

Data

We use the Continuous Employment Survey of Costa Rica (ECE, by its acronym in Spanish) made by the National Institute of Statistics and Censuses of Costa Rica (INEC), from 2010 to 2021. The ECE is a quarterly direct-interview survey that tracks the labor market as well as other demographic features. The sample is of probabilistic, stratified, two-stage cluster, replicated design, representative at the national, urban/rural and regional level, and with a random sample yearly rotation of 25% of the individuals each quarter, which makes it a semi-panel survey. This means that each individual is interviewed for at least four quarters before rotating out of the sample (INEC, 2012). Over 2020, the INEC made an important modification in its ECE panel dataset, extending the period of the panel from four to six quarters. It means that an individual can be found in 2020 panel during six quarter (including the firsts two quarters of 2021). As explained before, we exploited this panel to estimate the effect of the Covid-19 pandemic on the earnings differences between men and women, who can be observed pre- and post- Covid-19 pandemic.

For the estimations, the original samples of respectively 1,011,572 and 136,080 observations for our pooled cross-sectional- and a panel- dataset were restricted to individuals aged fifteen and older since that is the legal working age in Costa Rica. Applying these criteria, our final sample for our pooled cross-sectional dataset was of 316,787 individuals, ranging from 7,197 in the second quarter of 2011 to 8,614 in the second quarter of 2018. Men accounted for 63% of our final sample, while women for 37%. After applying the sample selection criteria to our panel dataset, our final sample was of 38,837

observations; with men accounting for 63% and women for 37%. Our final samples composition is shown in Table 1.

Table 1

Quarterly pooled cross-sectional-and panel- datasets composition by sex

Year	Quarter	Male		Female		Total	
		Obs.	*%*	*Obs.*	*%*	*Obs.*	*%*
2010	3	4933	63.96	2780	36.04	7713	100.00
2010	4	4938	63.60	2826	36.40	7764	100.00
2011	1	4796	65.97	2474	34.03	7270	100.00
2011	2	4619	64.18	2578	35.82	7197	100.00
2011	3	4888	63.10	2858	36.90	7746	100.00
2011	4	5146	62.33	3110	37.67	8256	100.00
2012	1	5026	63.77	2856	36.23	7882	100.00
2012	2	5005	62.28	3031	37.72	8036	100.00
2012	3	4883	61.37	3074	38.63	7957	100.00
2012	4	4869	60.81	3138	39.19	8007	100.00
2013	1	4734	63.01	2779	36.99	7513	100.00
2013	2	4985	61.34	3142	38.66	8127	100.00
2013	3	5047	61.47	3164	38.53	8211	100.00
2013	4	5081	60.44	3326	39.56	8407	100.00
2014	1	5085	62.87	3003	37.13	8088	100.00
2014	2	5156	63.10	3015	36.90	8171	100.00
2014	3	5334	62.73	3169	37.27	8503	100.00
2014	4	5373	62.89	3171	37.11	8544	100.00
2015	1	5265	64.84	2855	35.16	8120	100.00
2015	2	5026	63.09	2940	36.91	7966	100.00
2015	3	5352	63.60	3063	36.40	8415	100.00
2015	4	5287	63.21	3077	36.79	8364	100.00
2016	1	4950	65.17	2645	34.83	7595	100.00
2016	2	5162	62.74	3065	37.26	8227	100.00
2016	3	5238	63.83	2968	36.17	8206	100.00
2016	4	5261	62.82	3114	37.18	8375	100.00
2017	1	5191	63.48	2986	36.52	8177	100.00
2017	2	5125	62.02	3138	37.98	8263	100.00
2017	3	5363	62.53	3214	37.47	8577	100.00
2017	4	5247	62.46	3154	37.54	8401	100.00
2018	1	5181	65.51	2728	34.49	7909	100.00
2018	2	5422	62.94	3192	37.06	8614	100.00
2018	3	5302	62.00	3249	38.00	8551	100.00
2018	4	5194	62.62	3101	37.38	8295	100.00
2019	1	5155	62.58	3083	37.42	8238	100.00
2019	2	5210	60.74	3368	39.26	8578	100.00

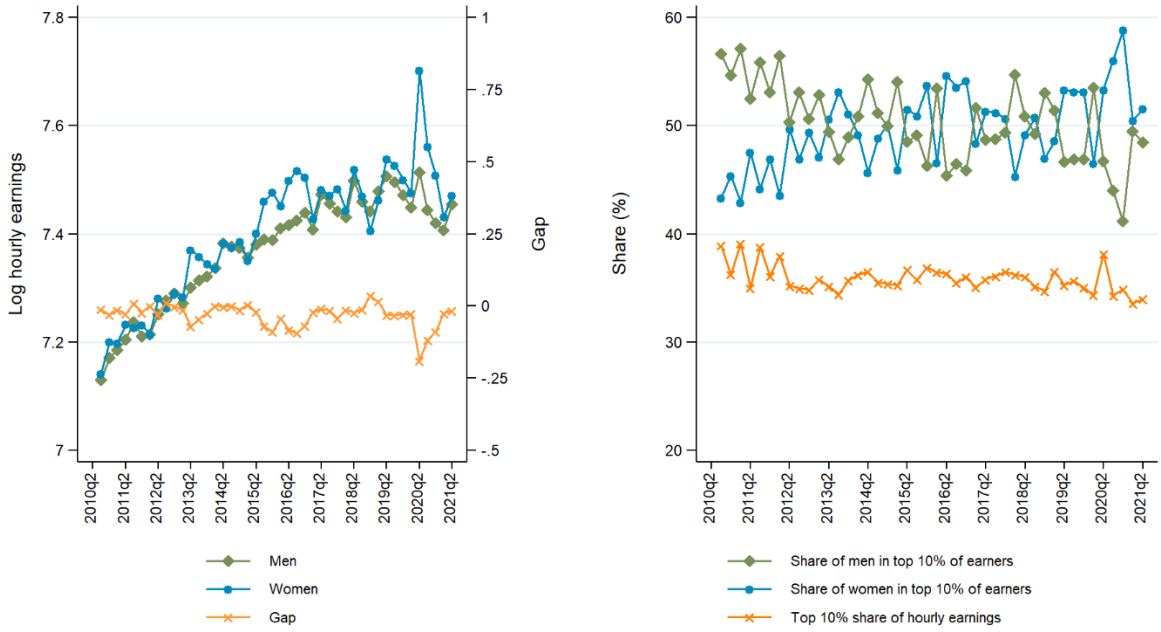
2019	3	5092	61.31	3213	38.69	8305	100.00
2019	4	5154	61.77	3190	38.23	8344	100.00
2020	1	4943	62.77	2932	37.23	7875	100.00
2020	2	3244	64.72	1768	35.28	5012	100.00
2020	3	3595	63.52	2065	36.48	5660	100.00
2020	4	4039	62.39	2435	37.61	6474	100.00
2021	1	4409	63.38	2548	36.62	6957	100.00
2021	2	4347	63.38	2512	36.62	6859	100.00

Note. The quarters filled in color gray are the ones with panel data observations.

Our main dependent variable of interest is the gross hourly labor earnings of workers, which is computed as the gross monthly wage divided by the working hours including overtime and excluding absenteeism, for both salaried and self-employed workers. As the literature suggested, the dependent variable is computed using the natural logarithm (Montenegro & Patrinos, 2014b). Figure 1 panel (a) shows the observed (unadjusted) males and females log hourly earnings and the gap between them; panel (b), the overall sample, men and women at the top 10% share of the earnings distribution. From the third quarter 2010 to the first quarter 2020, when we analyzed the total sample of individuals, the path of observed men and women log hourly earnings is quite similar and it was consistently higher for women (panel a). Thus, the observed gender earnings gap was in favor of women. Regarding the top 10% share of earners, it showed an irregular pattern comparing men and women groups. It highlighted that, overall, the percentage of men who were located in the top 10% share of the distribution decreased over the last decade, whereas the percentage of women increased. The proportion of the hourly earnings that represented the top 10% of earners showed a decreasing pattern over 2010-2021.

Figure 1

Observed log hourly earnings by sex and observed gender earning gap (panel a) and top 10% share distribution for the overall sample and by sex



We use a set of variables as earnings determinants that have been extensively validated in previous research (for a literature review see, Weichselbaumer & Winter-Ebmer, 2005). Schooling, potential experience (henceforth, experience), squared experience, and tenure were used as human capital determinants. We also included the following employment-related determinants: whether the employment was full- or part-time, workplace location, occupation's qualification level, industry, institutional sector, and size of the workplace. Table 2 shows the descriptive statistics of our labor earnings variable, the earnings determinants. For the Heckman's correction we considered the variables: age, marital status, schooling, and whether a person speaks a second language.

Table 2

Descriptive statistics of our overall dataset

Variable	Male		Female	
	Mean	*Std. dev*	*Mean*	*Std. dev*
Log hourly earnings	7.37	0.76	7.40	0.91
Age	40.29	13.57	39.43	12.20
Years of schooling	8.39	4.12	10.04	4.54
Experience (years)	25.90	14.84	23.40	13.84
Tenure (months)	91.95	112.03	72.79	92.29
Full-time or part-time employment (%)				
Full-time	80.57		60.97	
Part-time	19.43		39.03	
Institutional sector (%)				
Public	12.96		22.60	
Private	87.04		77.40	
The person lives in an urban area or a rural area (%)				
Urban area	53.28		63.78	
Rural area	46.72		36.22	
Qualification of the occupation (%)				
High	15.61		23.11	
Medium	54.84		52.56	
Low	29.55		24.33	
Industry of employment (%)				
Agriculture, forestry and fishing	26.03		5.88	
Mining and quarrying	0.28		0.03	
Manufacturing	8.44		6.29	
Electricity, gas, steam and air conditioning supply	2.18		0.49	
Water supply; sewerage, waste management and remediation activities	0.58		0.26	
Construction	7.37		0.37	
Wholesale and retail trade; repair of motor vehicles and motorcycles	17.28		19.53	

Transportation and storage	7.52	1.17
Accommodation and food service activities	4.69	11.68
Information and communication	0.92	0.57
Financial and insurance activities	1.31	1.86
Real estate activities	0.51	0.30
Professional, scientific and technical activities	1.75	2.13
Administrative and support service activities	4.63	2.47
Public administration and defence; compulsory social security	4.84	4.60
Education	3.57	13.24
Human health and social work activities	2.35	6.59
Arts, entertainment, and recreation	1.18	0.86
Other service activities	3.06	5.46
Activities of households as employers	1.49	16.19
Activities of extraterritorial organizations and bodies	0.02	0.03
Size of place of employment (%)		
1-3 people	36.47	46.56
4-9 people	13.39	11.85
10-29 people	14.40	14.61
30 or more people	35.74	26.99

Results

In the first subsection, the estimation of the gender earnings gap in Costa Rica and its determinants over the last decade is presented, based on the pooled cross-sectional dataset we worked with. In the second subsection, we present the estimated effect of the Covid-19 pandemic in Costa Rican gender earnings gap and its determinants, based on a panel dataset with individual observations pre- and post- pandemic. In the third subsection, we show two robustness check conducted for the Covid-19 effect estimation. Respectively, these tested the sample- and model- robustness.

Gender Labor Earnings Gap in Costa Rica Over the Last Decade

Table 3 shows the Mincerian earnings regression results. The human capital determinants, schooling, experience and tenure were related positively with both groups log hourly earnings. The schooling showed a stronger relationship for women than for men, while for experience it was the opposite. Regarding the job-related determinants, being employed in the public sector, the size of the firm, and the level of qualification of the employment were related positively with higher log hourly earnings for both groups and the relationship was particularly stronger for women. By contrary, being employed full-time, compared to half-time employments, was related negatively with log earnings for both groups. Overall, out of the twenty-one industries considered, when we compared these with agriculture and livestock, the log hourly earnings were higher. The relationship between the location of the firm and the log hourly earnings showed mixed results. It highlighted that comparing the rest of provinces with the one in which the capital city is located province, women earned lower than men. The main results for the Heckman selectivity bias correction, which were not the focus of our paper, can be seen in the Table A1 of the Statistical Appendix.

Table 3

Log hourly earnings estimations by sex

Variables	Men (N=199,018)		Women (N=117,769)	
	Coefficient	*SE*	*Coefficient*	*SE*
Years of schooling	0.0431***	(0.0005)	0.0512***	(0.0011)
Experience	0.0183***	(0.0003)	0.0147***	(0.0005)
Experience squared	-0.0003***	(0.0000)	-0.0003***	(0.0000)
Tenure	0.0007***	(0.0000)	0.0011***	(0.0000)
Qualification of the occupation (%) - High (Base)				
Medium	-0.4081***	(0.0046)	-0.4908***	(0.0068)
Low	-0.4643***	(0.0054)	-0.3383***	(0.0083)
Industry of employment (%) - Agriculture, forestry and fishing (Base)				
Mining and quarrying	0.1049***	(0.0249)	(omitted)	(0.1124)
Manufacturing	0.1346***	(0.0054)	(omitted)	(0.0112)
Electricity, gas, steam and air conditioning supply	0.1295***	(0.0118)	0.196***	(0.0284)
Water supply; sewerage, waste management and remediation activities	0.1661***	(0.0181)	0.2707***	(0.0376)
Construction	0.1909***	(0.0056)	0.2459***	(0.032)
Wholesale and retail trade; repair of motor vehicles and motorcycles	0.1506***	(0.0044)	0.2266***	(0.0095)
Transportation and storage	0.1614***	(0.0057)	0.297***	(0.019)
Accommodation and food service activities	0.2614***	(0.0067)	0.383***	(0.01)
Information and communication	0.2391***	(0.0145)	0.2792***	(0.0259)
Financial and insurance activities	0.3204***	(0.0127)	0.376***	(0.0168)
Real estate activities	0.339***	(0.0186)	0.3646***	(0.0346)
Professional, scientific and technical activities	0.2007***	(0.0108)	0.2956***	(0.0158)
Administrative and support service activities	0.1296***	(0.0068)	0.2366***	(0.0143)
Public administration and defence; compulsory social security	0.1305***	(0.0108)	0.254***	(0.0153)
Education	0.1935***	(0.0106)	0.2363***	(0.0132)
Human health and social work activities	0.2251***	(0.0113)	0.2388***	(0.013)
Arts, entertainment, and recreation	0.1438***	(0.0122)	0.137***	(0.0213)
Other service activities	-0.0243***	(0.0082)	0.0741***	(0.0119)

Activities of households as employers	0.3397***	(0.0111)	0.1824***	(0.01)
Activities of extraterritorial organizations and bodies	0.4892***	(0.0937)	0.4995***	(0.0952)
Workplace location - San José (Base)				
Alajuela	0.1094***	(0.0042)	0.0389***	(0.0059)
Cartago	-0.0189**	(0.0077)	-0.038***	(0.0112)
Heredia	0.1059***	(0.0065)	0.0521***	(0.0094)
Guanacaste	0.1054***	(0.0046)	0.0382***	(0.0062)
Puntarenas	0.0279***	(0.0044)	(omitted)	(0.0062)
Limón	0.0552***	(0.0045)	-0.0397***	(0.0063)
Out of country	0.1426***	(0.0284)	(omitted)	(0.0469)
Institutional sector - Private (Base)				
Public	0.2908***	(0.0086)	0.3572***	(0.0093)
Workplace Size - 1-3 people (Base)				
4-9 people	0.2998***	(0.0044)	0.3079***	(0.0068)
10-29 people	0.3504***	(0.0044)	0.3734***	(0.0069)
30 or more people	0.4815***	(0.0038)	0.4673***	(0.0065)
Full-time or part-time employment - Part-time (Base)				
Full-time	-0.3047***	(0.0037)	-0.2593***	(0.0043)
Constant	6.927***	(0.011)	6.6115***	(0.0274)

Notes. *** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses.

Table 4 reports the gender earnings gap at the mean, and its decomposition into the explained and unexplained components using the OB decomposition method. The men' mean of log hourly earnings was of 7.461 log points, while for the women was 7.356 log points. These results accounted for an earnings gap of 0.105 log points in favor of males over the total period of analysis. On the one hand, the coefficient associated to the explained component (endowments) was negative, which implies that the better conditions in the women' characteristics contributed to diminish the earnings gap over the period of analysis. On the other hand, the coefficient associated with the overall unexplained component (sum of coefficients and interaction terms) was positive, suggesting that men were leveraging their endowments more (higher productivity) than women. Intuitively, the preceding results means that the higher reward to the women's human capital and job-related characteristics compared with the men did not compensate their relatively less productive endowments As a net effect, during the period analyzed, the women's employment earnings were lower than the men's.

Table 4

Oaxaca-Blinder Decomposition Results

Variables	Differential	Endowments	Coefficients	Interaction
Estimated gap	0.105***			
	(0.0138)			
Prediction for men	7.461***			
	(0.00337)			
Prediction for women	7.356***			
	(0.0134)			
Public sector		-0.0335***	-0.0149***	0.00623***
		(0.00102)	(0.00286)	(0.00120)
Industry		-0.0475***	0.0254***	-0.0196***
		(0.00340)	(0.00712)	(0.00402)
Full time job		-0.0512***	-0.0280***	-0.00897***
		(0.000949)	(0.00349)	(0.00112)
Schooling		-0.0832***	-0.0806***	0.0131***
		(0.00194)	(0.0118)	(0.00193)
Experience		-0.00575***	0.0931***	0.0106***
		(0.000546)	(0.00732)	(0.000609)
Tenure		0.0205***	-0.0292***	-0.00749***
		(0.000614)	(0.00208)	(0.000553)
Occupation qualification		-0.0278***	0.0274***	-0.00462***
		(0.000876)	(0.00113)	(0.000723)

Workplace location	-0.000794***	-0.00657	0.00124***
	(0.000175)	(0.00692)	(0.000205)
Size of the workplace	0.0460***	0.00367**	0.00116
	(0.000986)	(0.00151)	(0.000730)
Total	-0.183***	0.297***	-0.00829**
	(0.00421)	(0.0138)	(0.00417)
Constant		0.307***	
		(0.0278)	
Obs.	316,787		

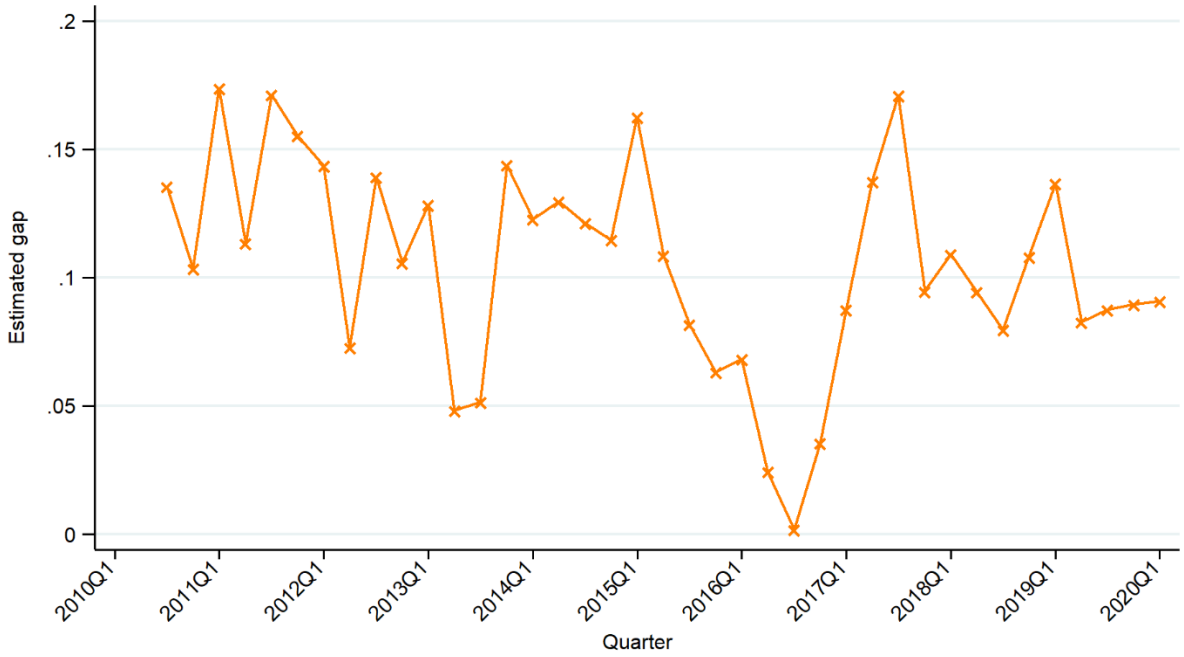
Notes. *** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses.

Table 4 further presents the individual contribution of each determinant of the gender earnings gap over the period of analysis. Regarding the explained part, on the one hand, respectively the schooling, full-time job, industry- and institutional sector- of the firm, workplace location and experience were the endowments with larger contribution bridging the gender earnings gap. On the other hand, the size of the workplace, and tenure contributed to increase the gender earnings gap. Regarding the unexplained part, on the one hand, respectively the women's more productive use of the endowments (schooling, tenure, full-time job, being employed on the public sector, and the workplace location) were explaining the higher earnings women were yielding comparing to men. On the other hand, the experience, occupation qualification, industry-, and size- of the firm in which a person was employed were increasing the gender earnings gap in favor of men.

Figure 2 reports the adjusted gender earnings gap over the period of analysis. This chronological perspective showed a clear pattern in favor of men. The gender earnings gap was positive (in favor of men) during all the quarterlies included in the period from the third quarter 2010 to the first quarter 2020. In the first quarter (third of 2010) of analysis the gender earnings gap was of 0.13 log points, whilst in the last quarter (first of 2020) of analysis it was of 0.09 log points.

Figure 2

Estimated Quarterly Gender Labor Earnings Gap Over the Last Decade in Costa Rica



The Effect of Covid-19 Pandemic on the Gender Earnings Gap

Table 5 summarizes the estimation of the log hourly earnings for men and women using the panel dataset with observations pre- and post- pandemic. Regarding human capital determinants, the results showed that schooling was the only predictor related positively with earnings for both groups. The experience was related positively only with men's earning; whilst tenure was related positively with women's earnings. As regards the job-related determinants, being employed in the public sector was the one with a larger positive relationship with earnings for both groups. Further, being employed in larger firms, and whether the person was employed on Covid-sensitive industries were related positively with earning. It highlighted the result obtained for this latter predictor, as it can be counterintuitive. We regarded the explanation behind this result is that, compared to less-Covid-sensitive industries, these industries job losses were more concentrated in more vulnerable positions (with lower earnings); conversely, their job losses in less vulnerable positions (with higher earnings) were lesser. As a net effect, it explained that the relative level of earning for these Covid-sensitive industries were relatively higher on the context on the Covid-19 pandemic. By contrary, whether a person was employed full-time compared to half-time, and the lower the qualification of the industry in which a person was employed were related negatively with earnings for both groups.

Table 5

Estimation Results of the Mincerian Earnings Functions for Our Panel Dataset

Variable	Male		Female	
	Coefficient	*SE*	*Coefficient*	*SE*
Institutional sector - Private sector (Base)				
Public sector	0.5206***	(0.0389)	0.6387***	(0.0635)
Whether the industry was one of the most affected for the pandemic - non-Covid-sensitive (Base)				
Covid-sensitive industries	0.0942***	(0.0215)	0.1328***	(0.0410)
Part-time or full-time employment - Part-time (Base)				
Full-time	-0.2684***	(0.0158)	-0.3293***	(0.0234)
Schooling	0.0244***	(0.0037)	0.0338***	(0.0062)
Experience	0.0182***	(0.0035)	0.0008	(0.0063)
Experience squared	-0.0003***	(0.0001)	-0.0001	(0.0001)
Tenure	0.0001	(0.0001)	0.0006***	(0.0002)
Qualification of the occupation - High (Base)				
Medium	-0.3509***	(0.0288)	-0.4283***	(0.0440)
Low	-0.3866***	(0.0328)	-0.2112***	(0.0535)
Size of place of employment - 1-3 people (Base)				
4-9 people	0.2645***	(0.0202)	0.3018***	(0.0379)
10-29 people	0.3585***	(0.0218)	0.4450***	(0.0408)
30 or more people	0.4259***	(0.0236)	0.5066***	(0.0416)
Constant	7.2210***	(0.0747)	7.1783***	(0.1311)
Observations	20,435		11,716	
Number of id	8,368		5,825	
R-squared	0.1831		0.2403	

Notes. *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors in parentheses. The industries regarded as Covid-sensitive were *Accommodation and food services*, *Transportation and storage*, and *Wholesale and retail trade*.

Table 6 reports the main decomposition results of the gender earnings gap applying the novel Stata *xtoaxaca* command. It allows us to conduct a before-after Covid-19 comparison of the gender earnings gap and to decompose the contribution of the explained- (endowments), the unexplained-component (coefficients and interaction), including the one associated to the Covid-19 pandemic (FE). The Table 6 panel (a) shows that the level of the gender earnings gap pre- and post- pandemic was negative in four out of the six quarters analyzed. It ranged from -0.030 log points in the first quarter of 2020 (pre- pandemic) to -0.189 log points in the second quarter of 2020 (immediate quarter after the pandemic started). The explained part (endowment) was significant over the entire period and it had a larger contribution to the gender earnings gap (in favor of women) the two immediate quarters after the start of the pandemic, then systematically fell until the last quarter analyzed. Regarding the unexplained part, the coefficients component had a significant contribution to the gender earnings gap (in favor of men) over the six quarters, with an irregular path. During three out of six quarter it had relative higher values, including the initial (pre pandemic), one in the middle and the final period analyzed; while the other three intermediate periods showed relative lower values. The fixed effect coefficient (FE), which is related to the effect of the Covid-19 pandemic on the gender earnings gap was significant in four out of six quarters analyzed. In all these four quarters its contribution was in favor of women, and respectively, the immediate quarters after the pandemic started were the ones with the higher magnitudes. We regard the explanation behind these results might be that: when the Covid-19 pandemic started, job losses were sharper in more vulnerable jobs that were concentrated in the private sector and industries in which there are more men than women and also are those in which men earned relatively higher than women. By contrary, the public sector and industries which relatively faced lesser job losses and with relatively higher salaries were women-dominated jobs. As a net effect, the Covid-19 pandemic presented a sharper reduction in men earnings employed at the time the pandemic started. However, this relative advantage in women earnings were diminishing the following quarters, because men pace of hiring (measured by job creation and the number of working hours) was faster than the one for women in jobs where men earned higher. As a complementary result, which is not the main objective of our paper but is intrinsically related to it, the effect of the Covid-19 pandemic is sharper in women job losses compared to men ones (as the section 2 presented above showed), and consequently, our results won't be interpreted as a lesser effect of the Covid-19 pandemic on the overall women's labor market conditions and only as it effect of the earnings gap between men and women into the labor market pre pandemic and at least one of the periods post pandemic.

Table 6 panel (b) presents the changes of the gender earnings gap between the immediate quarter before the Covid-19 pandemic (base time) and the other five quarters after the pandemic starts. The total change of the gender earnings gap was significant in two out of five quarters analyzed. These two quarters earnings' difference changes were in favor of women. The effect on the immediate quarter after the Covid-19 pandemic started was rather higher than the subsequent significant effect. Despite the three latter coefficients were not-significant, it highlighted that there was a change in the sign of the coefficient, which turned positive (not-significant gender earnings gap in favor of men in the latter two quarters). The explained (endowment) component contributed to the total change in the earnings gap in three out of the five changes analyzed compared to the quarter before the pandemic started. These contribution on bridging the gender earnings gap (in favor of women) was on three immediate quarters after the pandemic started and with an almost equal magnitude. Regarding the unexplained part, the coefficient component change was significant the immediate period after the pandemic start and also in favor of women. The fixed effect (FE) coefficient had the higher contribution to the gender earnings change during the three immediate quarters after the Covid-19 pandemic started. This contribution was negative, which means that the Covid-19 pandemic contributes to diminish the gender earnings gap (in favor of women). As explained above, these results may be explained by the sharper job losses in private sector vulnerable jobs, where are male-dominated employment. Also, these results showed that the relative advantage women had at the pandemic started has been diminishing since men's employment have had a faster recovery pace.

Table 6

Oaxaca-Blinder Decomposition Results from Panel Data

Outcome	Levels (a)						Change (b)					
	2020Q1	*2020Q2*	*2020Q3*	*2020Q4*	*2021Q1*	*2021Q2*	*2020Q1*	*2020Q2*	*2020Q3*	*2020Q4*	*2021Q1*	*2021Q2*
Observed	-0.030*	-0.189***	-0.122***	-0.082*	-0.015	-0.012	0.000	-0.160***	-0.092*	-0.052	0.014	0.017
	(0.012)	(0.033)	(0.036)	(0.038)	(0.039)	(0.026)	(.)	(0.029)	(0.036)	(0.040)	(0.039)	(0.027)
Decomposition												
Endowments	-0.097***	-0.141***	-0.151***	-0.140***	-0.103***	-0.085***	0.000	-0.027**	-0.027**	-0.028**	-0.011	-0.008
	(0.011)	(0.014)	(0.020)	(0.020)	(0.013)	(0.011)	(.)	(0.009)	(0.009)	(0.009)	(0.007)	(0.006)
Coefficients	0.104***	0.049*	0.084***	0.108***	0.091***	0.112***	0.000	-0.050**	0.013	0.029	0.003	0.019
	(0.018)	(0.022)	(0.025)	(0.026)	(0.017)	(0.024)	(.)	(0.019)	(0.026)	(0.024)	(0.029)	(0.025)
Interactions	0.008	0.022	0.051**	0.033	0.018	0.000	0.000	-0.006	-0.017*	-0.013	0.001	0.002
	(0.009)	(0.015)	(0.016)	(0.019)	(0.015)	(0.015)	(.)	(0.010)	(0.008)	(0.007)	(0.005)	(0.005)
FE	-0.051**	-0.184***	-0.175***	-0.171***	-0.031	-0.019	0.000	-0.133***	-0.124***	-0.120***	0.021	0.032
	(0.016)	(0.020)	(0.020)	(0.020)	(0.018)	(0.024)	(.)	(0.009)	(0.019)	(0.020)	(0.018)	(0.028)
Total	-0.037***	-0.253***	-0.192***	-0.169***	-0.024	0.008	0.000	-0.216***	-0.155***	-0.132***	0.013	0.045***
	(0.007)	(0.026)	(0.027)	(0.026)	(0.030)	(0.017)	(.)	(0.027)	(0.027)	(0.025)	(0.029)	(0.014)
Obs.	32,151						32,151					
ids.	12,538						12,538					

Notes. *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors in parentheses. Additional results of OB decomposition for panel data can be provided by the authors.

Sample and Model Robustness Check

We first applied a robustness check to the sample analyzed. It consisted on splitting our overall panel data sample into two subsamples, using three different criteria: whether the person employed was youth or not, lived in an urban or rural area, and was cohabiting with someone or not. Tables A2 to A4 of the Statistical Appendix shows the estimation results obtained for the six sub samples based on these criteria. Overall, those results were consistent with the results obtained for our total panel data sample. The earnings gap was in favor of women the immediate quarters after the pandemic started and particularly higher the first quarter. The explained component (endowments effect) contributed to bridge the gender earnings gap in favor of women. Overall, the unexplained component (sum of coefficients- and interaction- effect) contributed to increase the gender earnings gap (in favor of men). Overall, the effect of the Covid-19 pandemic contributed to diminish the gender earnings gap (in favor of women) and it was stronger the immediate quarters after the Covid-19 pandemic started.

We applied another check to test the robustness of our model, which consisted of estimating the earning gap by using the original Oaxaca-Blinder Decomposition method (*oaxaca* command in Stata) quarter by quarter instead of the method conducted in our main estimations (*xtoaxaca* command in Stata). Table A5 of the Statistical Appendix shows the results of the conventional OB decomposition for our panel dataset for the six quarters analyzed. The estimation results applying the conventional OB decomposition method were consistent with the estimations conducted in our main estimation model. The direction and the magnitude of the gender earnings gap were almost the same over the period analyzed and there were only slight differences in two out of six levels of significance. Particularly, the immediate quarter after the pandemic started, where we expected to capture the instantaneous and more accurate effect of the pandemic on earnings, was nearly the same in all dimensions considered (magnitude, direction and significance). Regarding the explained component of the gender earnings gap (endowments effect), it also showed a consistent pattern compared to our main estimations. It favored women over the period analyzed and it was stronger the three immediate quarters after the pandemic started. While, the unexplained component (sum of the coefficients- and interaction- effect) were in favor of men over the entire period and showed and irregular pattern in terms of the coefficients' magnitude.

Conclusion and Discussion

In this paper, we have analyzed the gender labor earnings gap in Costa Rica over the last decade, its determinants and the effect of the Covid-19 pandemic on this gap. We exploited the availability of a quarterly large-scale dataset with employment and socioeconomic data, which also includes a panel with individual observations pre and post pandemic, to estimate Mincerian earnings functions by sex and to decompose the gender pay earnings gap applying two OB approaches. As a key novelty, to the best of our knowledge, we applied for the first time the *xtoaxaca* Stata command, which allows us to decompose the change in the gender earnings gap with panel observations pre- and post- pandemic. We found that the estimated gender earnings gap in Costa Rica has shown a regular pattern in favor of men. The higher rewarded women obtained from their endowments did not compensate their lesser endowments' leveraging and it resulted on a gender labor earnings' gap on favor of men. Over the last decade, the main determinants that favor women's relative earnings were schooling, institutional sector, and whether a person had full-time job; while for men, the constant term was the most influential determinant of their relative higher earnings compared to women. According to previous literature, this constant term effect may be associated to unobserved differences in productivity and also as a discrimination component (for an in-depth explanation, see Blau & Lawrence M, 2017). The Covid-19 pandemic significantly affects the level and change of the gender earnings gap in two out of six quarters post- pandemic in favor of women (there were the two immediate quarters after the Covid-19 pandemic started). We regard the explanation behind these results might be that: when the Covid-19 pandemic started, job losses were sharper in more vulnerable jobs that were concentrated in the private sector and industries in which there were more men than women and also were those in which men earned relatively higher than women. By contrary, the public sector and industries who relatively faced lesser job losses and with relatively higher salaries were women-dominated jobs. As a net effect, the Covid-19 pandemic presented a sharper reduction in men earnings employed at the time the pandemic started. However, this relative advantage in women earnings were diminishing the following quarters, because men pace of hiring (measured by job creation and the number of working hours) was faster than the one for women in jobs where men earned higher. Our results are consistent with those obtained by previous literature (Deshpande, 2020; Doorley et al., 2021). As regards Deshpande (2020) empirical research, despite this author did not work with panel data, his comparison of two cross-sectional pre- and post- pandemic showed a sharper reduction on women labor earnings compared to men. The empirical research conducted by Doorley et al. (2021), which applied a microsimulation non-

parametric estimation based on cross-sectional data, also concluded that over the Covid-19 pandemic, the estimated decrease on men earnings may be higher compared to women.

From policy making perspective, this research provides empirical evidence about the main determinants of the gender labor earnings gap, which may be useful to guide the public policy seeking on diminishing the differences in earnings between men and women. For example, being the schooling the most influential determinant of the reduction of the gender earnings gap and the qualification of the occupation another significant determinant, educational programs focus on increasing women human capital on occupations with higher levels of qualification would contribute to reducing the gender labor earnings gap. Particularly, on the context of the Covid-19 pandemic, policy makers and their stakeholders should use this empirical evidence to identify the more profitable human capital- and job-related- determinants that they may have boost to increase people's labor earnings.

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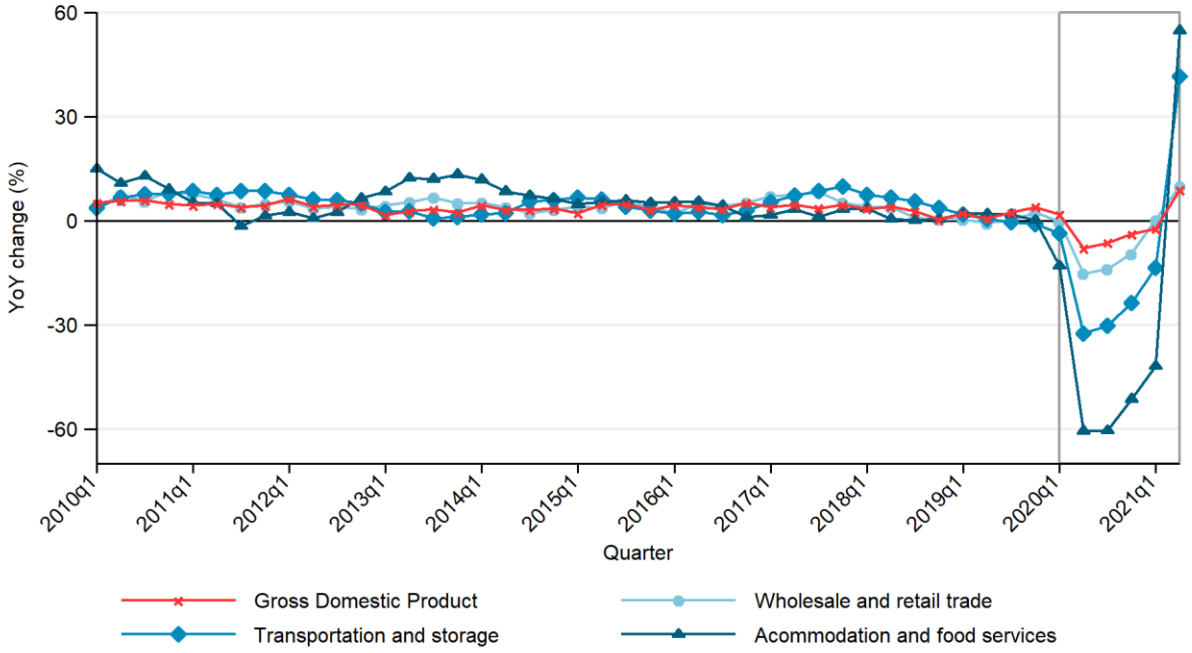
Statistical Appendix

Figure A1

Costa Rican Percentage Change of its Gross Domestic Product and the Three Industries Most Affected by the Covid-19 Pandemic Over the Last Decade



Note. The three industries which results are shown are the ones with a sharper reduction in its level of production. The remaining nineteen industries are represented by the Gross Domestic Product time series.

Figure A2

Evolution of the Main Costa Rican Labor Market Indicators Over the Last Decade

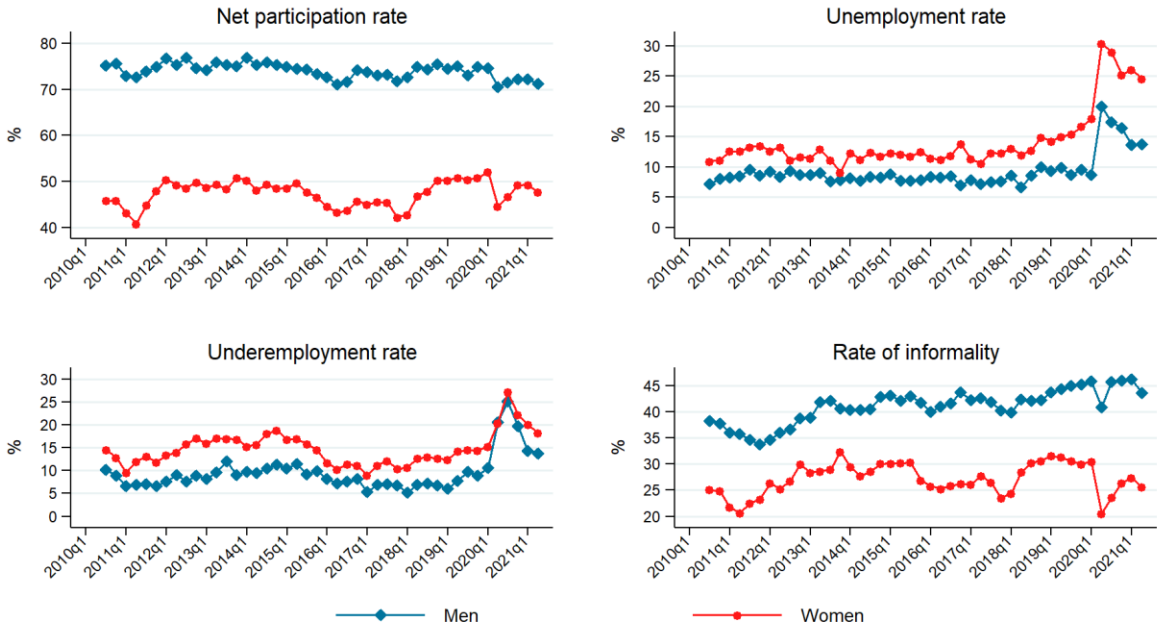


Table A1

Heckman's correction results

Variable	Male	Female
Schooling	0.0431***	0.0512***
	(0.000475)	(0.00108)
Experience	0.0183***	0.0147***
	(0.000328)	(0.000479)
Experience squared	-0.000270***	-0.000281***
	(5.34e-06)	(8.40e-06)
Tenure	0.000701***	0.00111***
	(1.43e-05)	(2.50e-05)
Public sector job	0.291***	0.357***
	(0.00863)	(0.00935)
Full-time employment	-0.305***	-0.259***
	(0.00370)	(0.00428)
Mining and quarrying	0.105***	0.172
	(0.0249)	(0.112)
Manufacturing	0.135***	0.0117
	(0.00538)	(0.0112)
Electricity, gas, steam and air conditioning supply	0.129***	0.196***
	(0.0118)	(0.0284)
Water supply; sewerage, waste management and remediation activities	0.166***	0.271***
	(0.0181)	(0.0376)
Construction	0.191***	0.246***
	(0.00559)	(0.0320)
Wholesale and retail trade; repair of motor vehicles and motorcycles	0.151***	0.227***
	(0.00443)	(0.00954)
Transportation and storage	0.161***	0.297***
	(0.00569)	(0.0190)
Accommodation and food service activities	0.261***	0.383***
	(0.00674)	(0.00998)
Information and communication	0.239***	0.279***
	(0.0145)	(0.0259)
Financial and insurance activities	0.320***	0.376***
	(0.0127)	(0.0168)
Real estate activities	0.339***	0.365***
	(0.0186)	(0.0346)
Professional, scientific and technical activities	0.201***	0.296***
	(0.0108)	(0.0158)
Administrative and support service activities	0.130***	0.237***
	(0.00678)	(0.0143)
Public administration and defence; compulsory social security	0.131***	0.254***
	(0.0108)	(0.0153)

Education	0.194***	0.236***
	(0.0106)	(0.0132)
Human health and social work activities	0.225***	0.239***
	(0.0113)	(0.0130)
Arts, entertainment, and recreation	0.144***	0.137***
	(0.0122)	(0.0213)
Other service activities	-0.0243***	0.0741***
	(0.00822)	(0.0119)
Activities of households as employers	0.340***	0.182***
	(0.0111)	(0.00997)
Activities of extraterritorial organizations and bodies	0.489***	0.500***
	(0.0937)	(0.0952)
Medium qualification job	-0.408***	-0.491***
	(0.00461)	(0.00678)
Low qualification job	-0.464***	-0.338***
	(0.00542)	(0.00830)
Workplace size: 4-9 people	0.300***	0.308***
	(0.00437)	(0.00675)
Workplace size: 10-29 people	0.350***	0.373***
	(0.00442)	(0.00691)
Workplace size: 30 or more people	0.482***	0.467***
	(0.00379)	(0.00647)
Workplace location: Alajuela	0.109***	0.0389***
	(0.00424)	(0.00590)
Workplace location: Cartago	-0.0189**	-0.0380***
	(0.00768)	(0.0112)
Workplace location: Heredia	0.106***	0.0521***
	(0.00655)	(0.00940)
Workplace location: Guanacaste	0.105***	0.0382***
	(0.00457)	(0.00619)
Workplace location: Puntarenas	0.0279***	-0.00114
	(0.00440)	(0.00616)
Workplace location: Limón	0.0552***	-0.0397***
	(0.00448)	(0.00631)
Workplace location: Out of country	0.143***	0.0216
	(0.0284)	(0.0469)
Constant	6.927***	6.611***
	(0.0110)	(0.0274)
Selection model		
Schooling	0.0388***	0.0936***
	(0.000648)	(0.000585)
Marital status: not single	1.147***	-0.0294***
	(0.00553)	(0.00448)
Age	-0.0122***	0.00243***

	(0.000148)	(0.000134)
Speaks second language	0.0824***	0.0262**
	(0.0103)	(0.0104)
Constant	-0.101***	-1.348***
	(0.00851)	(0.00868)
Athrho	-0.316***	0.0499**
	(0.00955)	(0.0201)
lnsigma	-0.519***	-0.455***
	(0.00202)	(0.00218)
rho	-0.3057	0.0498
	(0.0086)	(0.0200)
sigma	0.5952	0.6345
	(0.0012)	(0.0014)
lambda	-0.1819	0.0316
	(0.0054)	(0.0127)
Observations	322,317	366,881

Notes. *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors in parentheses.

Table A2

Estimations for the Panel Dataset Subsample According to the Age of the Person Criteria

Outcome	Youth (aged from 15 to 34)						Not youth (aged over 35)					
	2020Q1	*2020Q2*	*2020Q3*	*2020Q4*	*2021Q1*	*2021Q2*	*2020Q1*	*2020Q2*	*2020Q3*	*2020Q4*	*2021Q1*	*2021Q2*
Observed	-0.061**	-0.171***	-0.106*	-0.075	-0.046	-0.004	-0.013	-0.198***	-0.128**	-0.084*	-0.001	-0.016
	(0.021)	(0.037)	(0.044)	(0.040)	(0.033)	(0.029)	(0.013)	(0.040)	(0.043)	(0.034)	(0.027)	(0.040)
Decomp												
Endowments	-0.079***	-0.102***	-0.105***	-0.088**	-0.076**	-0.067**	-0.113***	-0.173***	-0.189***	-0.168***	-0.125***	-0.099***
	(0.018)	(0.020)	(0.027)	(0.034)	(0.025)	(0.024)	(0.008)	(0.014)	(0.018)	(0.018)	(0.013)	(0.014)
Coefficients	0.111	0.067	0.051	0.033	0.035	0.115	0.117**	0.042	0.091**	0.126**	0.098**	0.120***
	(0.107)	(0.094)	(0.070)	(0.080)	(0.083)	(0.089)	(0.041)	(0.036)	(0.032)	(0.046)	(0.036)	(0.034)
Interactions	-0.010	-0.015	0.024	0.022	0.008	-0.003	0.022	0.056**	0.083***	0.046*	0.034*	0.004
	(0.023)	(0.032)	(0.025)	(0.023)	(0.034)	(0.025)	(0.012)	(0.019)	(0.019)	(0.023)	(0.015)	(0.016)
FE	-0.015	-0.147	-0.083	-0.073	-0.013	0.018	-0.070*	-0.205***	-0.219***	-0.209***	-0.038	-0.040
	(0.100)	(0.095)	(0.075)	(0.081)	(0.079)	(0.069)	(0.033)	(0.037)	(0.033)	(0.030)	(0.025)	(0.035)
Total	0.007	-0.197***	-0.112**	-0.106***	-0.047	0.063*	-0.044**	-0.280***	-0.235***	-0.206***	-0.032*	-0.015
	(0.025)	(0.026)	(0.043)	(0.028)	(0.033)	(0.029)	(0.014)	(0.037)	(0.030)	(0.026)	(0.016)	(0.031)

Notes. *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors in parentheses. Additional results of OB decomposition for panel data can be provided by the authors.

Table A3

Estimations for the Panel Dataset Subsample According to Whether the Person Lived in an Urban or Rural Area Criteria

Outcome	Lived in an urban area						Lived in a rural area					
	2020Q1	*2020Q2*	*2020Q3*	*2020Q4*	*2021Q1*	*2021Q2*	*2020Q1*	*2020Q2*	*2020Q3*	*2020Q4*	*2021Q1*	*2021Q2*
Observed	0.016	-0.156***	-0.074***	-0.033	0.000	0.037	-0.050	-0.178***	-0.130*	-0.082**	0.009	-0.014
	(0.021)	(0.037)	(0.021)	(0.019)	(0.036)	(0.032)	(0.035)	(0.043)	(0.056)	(0.025)	(0.018)	(0.028)
Decomp												
Endowments	-0.090***	-0.127***	-0.127***	-0.123***	-0.085***	-0.060***	-0.115***	-0.153***	-0.181***	-0.155***	-0.118***	-0.107***
	(0.009)	(0.013)	(0.016)	(0.018)	(0.018)	(0.017)	(0.014)	(0.027)	(0.023)	(0.032)	(0.021)	(0.014)
Coefficients	0.117**	0.049	0.092*	0.112**	0.118**	0.118***	0.085	0.049	0.075	0.108***	0.058	0.114**
	(0.039)	(0.036)	(0.037)	(0.040)	(0.039)	(0.036)	(0.055)	(0.043)	(0.049)	(0.029)	(0.032)	(0.042)
Interactions	0.007	0.032**	0.037**	0.024	0.009	-0.003	0.014	-0.004	0.060**	0.033	0.026	-0.002
	(0.013)	(0.010)	(0.012)	(0.014)	(0.019)	(0.014)	(0.021)	(0.025)	(0.023)	(0.026)	(0.022)	(0.023)
FE	-0.050	-0.202***	-0.149***	-0.149***	-0.022	-0.028	-0.046	-0.156***	-0.200***	-0.171***	-0.029	0.011
	(0.029)	(0.035)	(0.031)	(0.029)	(0.036)	(0.033)	(0.038)	(0.038)	(0.026)	(0.023)	(0.021)	(0.023)
Total	-0.016	-0.248***	-0.147***	-0.135***	0.020	0.027	-0.062*	-0.263***	-0.245***	-0.185***	-0.062**	0.016
	(0.020)	(0.030)	(0.018)	(0.018)	(0.036)	(0.020)	(0.026)	(0.032)	(0.039)	(0.023)	(0.020)	(0.023)

Notes. *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors in parentheses. Additional results of OB decomposition for panel data can be provided by the authors.

Table A4

Estimations for the Panel Dataset Subsample According to Whether the Person Was Cohabiting or Not Criteria

Outcome	***Cohabiting***						***Does not Cohabiting***					
	2020Q1	*2020Q2*	*2020Q3*	*2020Q4*	*2021Q1*	*2021Q2*	*2020Q1*	*2020Q2*	*2020Q3*	*2020Q4*	*2021Q1*	*2021Q2*
Observed	-0.027	-0.247***	-0.170***	-0.153***	-0.038	-0.022	-0.075**	-0.170***	-0.122**	-0.075	-0.059	-0.047*
	(0.015)	(0.044)	(0.025)	(0.042)	(0.026)	(0.046)	(0.026)	(0.045)	(0.047)	(0.057)	(0.031)	(0.023)
Decomp												
Endowments	-0.117***	-0.201***	-0.235***	-0.218***	-0.130***	-0.128***	-0.086***	-0.102***	-0.112***	-0.095***	-0.100***	-0.069***
	(0.016)	(0.014)	(0.027)	(0.022)	(0.016)	(0.020)	(0.016)	(0.021)	(0.025)	(0.025)	(0.018)	(0.013)
Coefficients	0.093	0.014	0.043	0.109**	0.083*	0.158***	0.091	0.040	0.063	0.032	0.045	0.048
	(0.048)	(0.055)	(0.048)	(0.042)	(0.037)	(0.034)	(0.061)	(0.065)	(0.051)	(0.041)	(0.051)	(0.041)
Interactions	0.015	0.060***	0.122***	0.078***	0.026	0.007	0.010	0.004	0.023	0.024	0.033	0.021
	(0.016)	(0.016)	(0.032)	(0.021)	(0.020)	(0.018)	(0.014)	(0.020)	(0.023)	(0.020)	(0.020)	(0.016)
FE	-0.026	-0.276***	-0.219***	-0.248***	-0.023	-0.008	-0.112*	-0.134***	-0.183***	-0.157***	-0.075*	-0.073
	(0.043)	(0.042)	(0.043)	(0.036)	(0.032)	(0.040)	(0.050)	(0.036)	(0.038)	(0.035)	(0.038)	(0.040)
Total	-0.034**	-0.403***	-0.290***	-0.278***	-0.044*	0.028	-0.096***	-0.192***	-0.209***	-0.197***	-0.096***	-0.073***
	(0.012)	(0.036)	(0.019)	(0.031)	(0.022)	(0.033)	(0.020)	(0.044)	(0.028)	(0.047)	(0.023)	(0.018)

Notes. *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors in parentheses. Additional results of OB decomposition for panel data can be provided by the authors.

Table A5

Oaxaca-Blinder Estimations Based on the Panel Dataset

Outcome	*2020Q1*	*2020Q2*	*2020Q3*	*2020Q4*	*2021Q1*	*2021Q2*
Observed	-0.0277	-0.188***	-0.118***	-0.0885***	-0.0237	-0.0157
	(0.0186)	(0.0264)	(0.0244)	(0.0225)	(0.0206)	(0.0207)
Decomposition						
Endowments	-0.0933***	-0.237***	-0.218***	-0.189***	-0.110***	-0.122***
	(0.0153)	(0.0227)	(0.0215)	(0.0201)	(0.0180)	(0.0180)
Coefficients	0.0727***	0.0484**	0.0606***	0.0789***	0.0773***	0.105***
	(0.0150)	(0.0204)	(0.0188)	(0.0175)	(0.0165)	(0.0162)
Interactions	-0.00707	7.50e-05	0.0395***	0.0221	0.00873	0.000645
	(0.0104)	(0.0153)	(0.0145)	(0.0141)	(0.0130)	(0.0123)
Observations	7,877	5,013	5,660	6,474	6,957	6,860

Notes. *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors in parentheses. Additional results of OB decomposition for panel data can be provided by the authors.